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Office of Solid Waste
and Renewable Resources

GEOGRAPHIC INFORMATION SYSTEMS (GIS) SOLID WASTE MANAGEMENT FACILITIES SITE SCREENING

Illinois Department of Energy and Natural Resources

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INTRODUCTION

The siting of any type of solid waste management facility (landfill, transfer station, waste-to-energy plant) requires the consideration of many diverse physical features and is often made more difficult because of social constraints such as the NIMBY syndrome—"not in my back yard." In general, certain features such as drinking water supplies, subdivisions, parks, wetlands, etc. must be avoided when siting waste management facilities. Desirable siting criteria such as site geology for a sanitary landfill or the proximity of steam customers for a waste-to-energy facility must also be considered.

GEOGRAPHIC INFORMATION SYSTEMS

In the past 10 years, Geographic Information Systems (GIS) have been developed which can assist decision makers as they attempt to solve site screening and selection problems. A GIS can assemble a complex assortment of paper maps and tabular information into an understandable array of "electronic maps" that can be easily viewed and analyzed according to any set of siting specifications.

The GIS is an analytical tool comprised of three basic components: computer hardware, software, and data. The system is capable of storing and analyzing large amounts of siting data, and thus it is particularly useful for screening large areas of land to determine potential site suitability.

Any map information can be input into a geographic information system's data files. Software can register maps to a common datum, resolve slight scale variations, and perform a number of analytical tasks. The GIS is also capable of creating a buffer around specific features and automatic map coverage overlays.

ENR SITING ASSISTANCE

The Illinois Solid Waste Management Act authorizes the Department of Energy and Natural Resources (ENR) to provide general siting assistance to local units of government. General siting assistance is defined by departmental policy as conducting a regional screening of siting criteria at a scale of approximately one inch to one mile.

The analysis conducted by the Geographic Information System is a preliminary screening phase of the site selection process. The intent is not to identify specific sites or parcels of property at this level of study, but rather to establish the boundaries of suitable areas. GIS screening will identify areas of suitability based upon criteria selected by the unit of local government. The preliminary screening will be conducted by ENR at no cost to local units of government in Illinois. A second study phase should follow, but is beyond the scope of ENR's free siting assistance program. The second phase of study will involve extensive field work to confirm and refine the findings of phase one.

SITING CRITERIA

It is the responsibility of local governments to review site approval requests for regional pollution control facilities against siting criteria in the Environmental Protection Act. Such facilities include most kinds of waste handling operations: waste storage sites, sanitary landfills, transfer stations, and incinerators. If a unit of local government is evaluating prospective locations as part of a solid waste plan, additional siting criteria may be developed as needed for use in the GIS analysis.

Units of local government have studied certain features with respect to landfill siting. An example of features that have been used in the GIS are: historical architectural sites, archeologic and paleontologic sites, endangered/threatened species habitat, developed areas, locations of committed development, proximity to existing highways, geologic material type, surface waters and wetlands, water supply wells, aquifers, and areas of extensive oil exploration and production.

While local decision makers may choose to consider some or all of these features, ENR does not imply that the list is all-inclusive. Other features can be included in the analysis by the local siting authority.

DATA COLLECTION

An adequate regional screening can be conducted at a scale of one inch to one mile (1:62,500). However, much of the data necessary to complete such an analysis does not currently reside in the GIS files. Therefore, files must be created by digitizing from paper maps. To conduct the screening, good quality paper (or mylar) maps that depict pertinent features at a suitable scale must be available. The quality of GIS analysis depends upon reliable and accurate input maps. ENR and the local unit of government will share the responsibility of obtaining accurate maps to conduct the analysis.

Some features, particularly geologic and hydrogeologic features, have not been mapped in great detail for many areas of Illinois. In some counties, mapping of these features is accurate only to a scale of one inch to approximately eight miles. To prepare more detailed information requires extensive and costly research. While ENR can perform that research through the State Geological Survey, this work is in addition to the general siting assistance program. Local governments may contract for geologic and hydrogeologic research or perform a GIS regional screening which omits these criteria from consideration.

PRODUCTS

ENR will provide free of charge to the unit of local government a series of maps which:

1. illustrate each siting criterion individually (e.g., a map depicting natural areas, etc., each with appropriate documentation and legend). For example, if 16 criteria are listed, a set of 16 maps, each illustrating a different feature, will be provided, subject to the availability of useful data.

2. illustrate areas of suitability which remain following the GIS analysis. One or more composite maps which show only the areas meeting selected site screening criteria will be produced.

These products can be used as a starting point for phase two of the process and to illustrate to the public and other parties exactly how the screening process was conducted. In addition, the GIS presents a step-by-step picture to explain how areas were excluded from consideration.

COSTS

ENR will conduct a regional screening at a scale of one inch to one mile or smaller based upon useful, existing, or readily compilable mapped information. This screening is free of charge to units of local government. Additional costs may be incurred if extensive field work and data interpretation are required. Before starting GIS siting and analysis activity, a meeting will be scheduled between staff members of the Office of Solid Waste and Renewable Resources and the Geological Survey and local government representatives. Through this meeting local governments will receive an assessment of available data and alternative approaches.

CONCLUSION

Regional screening to delimit suitable areas for waste management facilities is an important step in the site selection process. At the beginning of the process, county and regional planning areas are considered equally. The analytical process uses the criteria selected by local authorities to selectively eliminate unsuitable areas from consideration while simultaneously including selected locations. The result is a series of maps that illustrate suitable areas. The process is objective, and the product can be used to illustrate desirable locations for waste management facilities.

For more information on solid waste management, call 1-800-252-8955 (within Illinois)

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